

**(2.3) Equation of a Circle**

The equation of a circle is  $x^2 + y^2 = r^2$

Formula for the radius is  $r = \sqrt{x^2 + y^2}$

The distance from the origin to a point on the circumference of a circle is the length of the radius of the circle.

What are the coordinates of A? \_\_\_\_\_

What is the length of the horizontal line in the triangle? \_\_\_\_\_

What is the length of the vertical line in the triangle? \_\_\_\_\_

Show two ways to determine the length of the hypotenuse of the triangle.

**Distance Formula** **Pythagorean Theorem**

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The distance from the origin to a point on the circumference of a circle is the length of the radius of the circle.

What are the coordinates of A?  $(2.5, 3)$

What is the length of the horizontal line in the triangle?  $2.5$

What is the length of the vertical line in the triangle?  $3$

Show two ways to determine the length of the hypotenuse of the triangle.

**Distance Formula** **Pythagorean Theorem**

$(0,0) (2.5,3)$   
 $x_1, y_1, x_2, y_2$   
 $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$   
 $d = \sqrt{(2.5 - 0)^2 + (3 - 0)^2}$   
 $d = \sqrt{6.25 + 9}$   
 $d = \sqrt{15.25}$   
 $d \approx 3.9$

$r = \sqrt{x^2 + y^2}$   
 $r = \sqrt{(2.5)^2 + (3)^2}$   
 $r = \sqrt{6.25 + 9}$   
 $r = \sqrt{15.25}$   
 $r \approx 3.9$

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i) What is the radius of the circle in the graph?

ii) What are the x and y intercepts of the circle in the graph?

iii) What is the equation of the circle in the graph?

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i) What is the radius of the circle in the graph?

$r = 3.9$  (estimation)  $(2.5, 3)$   
 $r = 4$

ii) What are the x and y intercepts of the circle in the graph?

$x \text{ int} = 4 \text{ and } -4$   
 $y \text{ int} = 4 \text{ and } -4$

iii) What is the equation of the circle in the graph?

$x^2 + y^2 = r^2$   
 $x^2 + y^2 = 4^2$   
 $x^2 + y^2 = 16$

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**Example 1:** A circle has its centre at the origin and passes through the point  $(9, -3)$ .

a) Determine the equation of the circle.

b) Determine the coordinates of the other endpoint of the diameter through  $(9, -3)$

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**Example 1:** A circle has its centre at the origin and passes through the point  $(9, -3)$ .

a) Determine the equation of the circle.

$x^2 + y^2 = r^2$   
 $9^2 + (-3)^2 = r^2$   
 $81 + 9 = r^2$   
 $90 = r^2$   
 $x^2 + y^2 = 90$

b) Determine the coordinates of the other endpoint of the diameter through  $(9, -3)$

$(-9, 3)$   $(-9, 3)$

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**Example 2:** A tire has a radius of 0.5m. Determine the equation of the circle that models the outside of the tire. Assume the centre of the tire is at (0, 0).

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$$x^2 + y^2 = r^2 \quad r = 0.5$$

$$x^2 + y^2 = (0.5)^2$$

$$x^2 + y^2 = 0.25$$

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**Example 3:** A seagull carrying a small fish drops it in the middle of a lake. The resulting ripple moves at 0.6m/s. What is the equation of the circle that defines the circular ripple after 1 minute?

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$$x^2 + y^2 = r^2$$

$$r = 0.6 \text{ m/s} \\ \times 60 \text{ s} \\ = 36 \text{ m}$$

$$x^2 + y^2 = 36^2$$

$$x^2 + y^2 = 1296$$

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Homework

Pg. 91-93 # 1,2, 3a)c),4, 7, 11 & 13

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